

CLAIMS

1. A position monitoring device configured to determine if a global position of a monitored device is within a criteria region defined within a global position coordinate system.
2. A position monitoring device in accordance with claim 1, wherein the criteria region is a three dimensional region defined in a three dimensional coordinate system.
3. A position monitoring device in accordance with claim 2, wherein the criteria region comprises:
 - a two dimensional criteria area defined in a plane; and
 - a criteria height defined in an axis perpendicular to the plane.
4. A position monitoring device in accordance with claim 3, wherein the criteria height comprises:
 - a maximum height above the plane; and
 - a minimum height below the plane.
5. A position monitoring device in accordance with claim 1, wherein the criteria region is a two dimensional area.
6. A position monitoring device in accordance with claim 5, wherein the two dimensional area is a polygon having a plurality of sides formed by a series of line segments.
7. A position monitoring device in accordance with claim 5, wherein the two dimensional area is a circle.
8. A position monitoring device in accordance with claim 1, wherein the criteria region is stationary relative to the coordinate system.

9. A position monitoring device in accordance with claim 1, wherein the criteria region is defined relative to a dynamic reference position.
10. A position monitoring device in accordance with claim 9, wherein the dynamic reference position is a monitoring device global position of the monitoring device.
11. A position monitoring device in accordance with claim 10, comprising:
 - a global position satellite (GPS) receiver for providing the monitoring device global position.
12. A position monitoring device in accordance with claim 1, comprising:
 - a receiver for receiving the monitored device global position through a wireless channel.
13. A position monitoring device in accordance with claim 12, comprising an output device for conveying, to a user, the monitored device global position relative to the criteria region.
14. A position monitoring device in accordance with claim 13, wherein the output device is an audio device providing an audio alarm signal when an alert condition based on a relationship between the criteria region and the monitored device global position is met.
15. A position monitoring device in accordance with claim 13, wherein the output device is a visual display graphically displaying the relative position between the monitored device global position and the criteria region.
16. A position monitoring device in accordance with claim 13, wherein the output device is a vibratory device providing vibratory alarm signal when an alert condition based on a relationship between the criteria region and the monitored device global position is met.

17. A position monitoring device in accordance with claim 13, wherein the output device is a radio frequency transmitter for transmitting a radio frequency alarm signal to the monitored device.

18. A position monitoring device in accordance with claim 13, wherein the output device is a sonic transmitter for transmitting a sonic alarm signal to the monitored device.

19. A position monitoring device comprising:
a wireless receiver for receiving, through a wireless channel, a monitored device global position from a monitored device;
a memory for storing a criteria region defined within a global position coordinate system; and
a controller for determining if the monitoring device global position is within the criteria region.

20. A position monitoring device in accordance with claim 19, further comprising an output device for conveying, to a user, the monitored device global position relative to the criteria region.

21. A position monitoring device in accordance with claim 19, further comprising an output device responsive to the controller and providing an alarm when an alert condition based on a relationship between the criteria region and the monitored device global position is met.

22. A position monitoring device in accordance with claim 20, wherein the output device is an audio device providing an audio alarm signal when an alert condition based on a relationship between the criteria region and the monitored device global position is met.

23. A position monitoring device in accordance with claim 13, wherein the output device is a vibratory device providing a vibratory alarm signal when an alert condition based on a relationship between the criteria region and the monitored device global position is met.

24. A position monitoring device in accordance with claim 20, wherein the output device is a visual display graphically displaying the relative position between the monitored device global position and the criteria region.

25. A position monitoring device in accordance with claim 20, wherein the output device is a vibratory device providing vibratory alarm signal when an alert condition based on a relationship between the criteria region and the monitored device global position is met.

26. A position monitoring device in accordance with claim 19, wherein the output device simultaneously conveys, to the user, a plurality of relationships between a plurality of monitored devices and at least one criteria region.

27. A position monitoring device in accordance with claim 21, wherein the alert condition is met when the monitored device is within the criteria region.

28. A position monitoring device in accordance with claim 21, wherein the alert condition is met when the monitored device is outside of the criteria region.

29. A position monitoring device in accordance with claim 21, wherein the alert condition is met when a distance between the monitored device and the monitoring device is greater than a maximum distance threshold.

30. A position monitoring device in accordance with claim 29, further comprising an input device for receiving data input from a user, the data input at least partially defining the criteria region.

31. A position monitoring device in accordance with claim 30, wherein the input device is for providing, to the controller, a series of definition points located on a perimeter of the criteria region.

32. A position monitoring device in accordance with claim 31, wherein the input data is an indication of a monitored device global position when the monitored device is located at a definition point.

33. A position monitoring device in accordance with claim 32, wherein the input device is a push button switch providing each definition point in response an activation of the switch when the monitoring device is positioned at a definition point.

34. A position monitoring device comprising:

- a wireless receiver for receiving, through a wireless channel, a monitored device global position from a monitored device;
- a global positioning satellite (GPS) receiver for providing a monitoring device global position of the monitoring device;
- an input device responsive to a user to provide a series of definition points;
- a memory for storing the criteria region having a perimeter comprising a series of line segments connecting the definition points within a global position coordinate system;
- a controller for determining if the monitoring device global position is within the criteria region; and
- an output device for conveying to the user a relationship between the criteria region and the monitored device global position.

35. A position monitoring device in accordance with claim 34, wherein the criteria region is a three dimensional region defined in a three dimensional coordinate system.

36. A position monitoring system comprising:
a monitored device for wirelessly transmitting a monitored device global position based on global positioning satellite (GPS) signals; and
a monitoring device for determining based on the monitored device global position received from the monitored device, if the monitored device is within a criteria region.

37. A method for monitoring a position of a monitored device, the method comprising:

determining if a relationship between a monitored device global position of a monitored device and a criteria region defined within a global position coordinate system is defined by an alert criteria.

38. A method performed by a monitoring device for monitoring a position of at least one monitored device, the method comprising:

receiving a monitored device global position from a monitored device through a wireless channel;
establishing a monitoring device global position based on signals received from a global position satellite (GPS) system;

retrieving from memory a criteria region defined within a global position coordinate system;

determining if a positional relationship between the monitored device global position and the criteria region meets an alert criteria;

providing an alarm to a user of the monitoring device if the relationship meets the alert criteria.

39. A method in accordance with claim 38, wherein the providing the alarm comprises providing an audible alarm.

40. A method in accordance with claim 38, wherein the providing the alarm comprises providing a visual alarm.

41. A method in accordance with claim 38, wherein the providing the alarm comprises providing a vibratory alarm.

42. A method in accordance with claim 38, wherein determining if the positional relationship between the monitored device global position and the criteria region meets an alert criteria comprises:

determining if the monitored device global position is located inside the criteria region.

43. A method in accordance with claim 38, wherein determining if the positional relationship between the monitored device global position and the criteria region meets an alert criteria comprises:

determining if the monitored device global position is located outside the criteria region and a distance between the monitored device global position and the monitoring device global position is greater than a maximum distance threshold.

44. A method performed by a monitoring device for monitoring a position of at least one monitored device, the method comprising:

receiving a monitored device global position from a monitored device through a wireless channel;

establishing a monitoring device global position based on signals received from a global position satellite (GPS) system;

retrieving from memory a criteria region defined within a global position coordinate system;

determining if the monitored device global position is within the criteria region;

determining if a distance between the monitoring device global position and the monitored device global position is greater than a maximum distance threshold;

providing an alarm to a user of the monitoring device if: the distance is greater than the maximum and the monitored device is outside the criteria region.

45. A monitoring device comprising:

a global positioning satellite (GPS) receiver providing a monitoring device global position;

a compass for providing a global reference direction;

a controller for determining, based on an orientation of the monitoring device to the global reference direction, a plurality of tracking indicators indicating a plurality of tracking directions from the monitoring device global position to each of a plurality of monitored device global positions; and

a visual display for simultaneously providing the plurality of tracking indicators to the user as a plurality of visual indicators indicating the tracking directions.

46. A monitoring device in accordance with claim 45, further comprising a wireless receiver for receiving the plurality of monitored device global positions from a plurality of monitored devices.

47. A monitoring device in accordance with claim 46, wherein the controller is for establishing the tracking indicators by:

determining the tracking directions based on a plurality of relative positions between the monitoring device global position and the monitored device global positions;

calculating an offset angle between the global reference direction and an orientation direction of the monitoring device; and

applying the offset angle to each tracking direction to provide each tracking indicator.

48. A monitoring device in accordance with claim 47, further comprising an audio output device for providing an audible alarm when any one of a plurality of distances between each monitored device global position and the monitoring device global position is greater than a maximum distance threshold.

49. A portable monitoring device for tracking a plurality of portable monitored devices, the monitoring device comprising:

 a global positioning satellite (GPS) receiver providing a monitoring device global position;

 a compass for providing a global reference direction;

 a controller for providing a plurality of tracking direction indicators indicating a plurality of tracking directions from the monitoring device global position to the plurality of monitored device global positions by determining each tracking direction based on a relative position between the monitoring device global position and each monitored device global position, determining an offset angle between a monitoring device orientation direction and the global reference direction and applying the offset angle to each tracking direction to provide each tracking indicator; and

 a visual display for simultaneously displaying a plurality of visual tracking indicators based on the tracking direction indicators, the visual tracking indicators indicating the tracking directions.

50. A portable monitoring device in accordance with claim 49, wherein the compass is a magnetic compass providing a global reference direction relative to a magnetic polarity of Earth.

51. A portable monitoring device in accordance with claim 49, wherein the global reference direction is referenced to polar north.

52. A portable monitoring device in accordance with claim 51, wherein the global reference is polar north.

53. A portable monitoring device in accordance with claim 52, wherein the global reference direction is calibrated to magnetic north in accordance with a geographical location of the monitoring device.

54. A method in accordance with claim 53, wherein the calibrating comprises:

accepting input data from a user indicating the geographical region; and

retrieving from memory a calibration factor associated with the geographical region.

55. A method for monitoring a global position of a plurality of monitored devices relative to a monitoring device global position, the method comprising:

calculating a monitoring device global position of a monitoring device;

receiving a plurality monitored device global positions through a wireless channel;

retrieving from a compass, a global reference direction;

determining, based on an orientation of the monitoring device to the global reference direction, a plurality of tracking indicators indicating a plurality of tracking directions from the monitoring device global position to each of a plurality of monitored device global positions; and

simultaneously displaying the plurality of tracking indicators to a user as a plurality of visual indicators indicating the tracking directions.

56. A method in accordance with claim 55, wherein the determining comprises:

determining the tracking directions based on a plurality of relative positions between the monitoring device global position and the monitored device global positions;

calculating an offset angle between the global reference direction and an orientation direction of the monitoring device; and

applying the offset angle to each tracking direction to provide each tracking indicator.

57. A method in accordance with claim 56, further comprising:
providing an audible alarm when any one of a plurality of distances
between each monitored device global position and the monitoring device global
position is greater than a maximum distance threshold.

58. A method for tracking a plurality of portable monitored
devices, the method comprising:

retrieving a monitoring device global position from a
global positioning satellite (GPS) receiver;

accepting, from a compass, a signal indicating a global
reference direction;

providing a plurality of tracking direction indicators
indicating a plurality of tracking directions from the monitoring device global position
to the plurality of monitored device global positions by determining each tracking
direction based on a relative position between the monitoring device global position
and each monitored device global position;

determining an offset angle between a monitoring
device orientation direction and the global reference direction;

applying the offset angle to each tracking direction
to provide each tracking indicator; and

simultaneously displaying a plurality of visual tracking
indicators based on the tracking direction indicators, the visual tracking indicators
indicating the tracking directions.

59. A method in accordance with claim 58, wherein the compass
is a magnetic compass providing a global reference direction relative to a magnetic
polarity of Earth.

60. A method in accordance with claim 58, wherein the global
reference direction is referenced to polar north.

61. A method in accordance with claim 60, wherein the
global reference is polar north.

62. A method in accordance with claim 58, further comprising:

calibrating the global reference direction to magnetic north in accordance with a geographical location of the monitoring device.

63. A method in accordance with claim 62, wherein the calibrating comprises:

accepting input data from a user indicating the geographical region; and

retrieving from memory a calibration factor associated with the geographical region.